What is claimed is

1. A method for operating a wireless communication system receiver comprising the steps of:

receiving a plurality of input signals;

weighting said plurality of input signals; and

combining said weighted plurality of signals to form an output signal,

wherein weights used in said weighting step are adjusted to increase power in said output signal of in-band components and decrease power in said output signal of out-of-band components.

2. The method of claim 1 wherein said weights are determined by maximal ratio combining (MRC) to align phases of said input signals to the same phase and to scale said input signals in proportion to a square root of a received signal-to-noise ratio.

3. The method of claim 2 further comprising the step of normalizing the signal level before the step of weighting said plurality of input signals.

4. The method of claim 2 further comprising the step of:

adjusting a signal level of the received input signals if said signal level is greater than a predetermined value.

5. The method of claim 1 wherein said weights are determined by the steps of:

determining a complex error signal by a complex conjugate multiplication of each of said input signals and a reference complex signal; and

low pass filtering said error signal to determine said antenna weights.

6. The method of claim 2 further comprising the step of:

maintaining a magnitude of said weights.

7. The method of claim 1 wherein said weights are applied to a respective one at said input signals using a modulator.

8. The method of claim 7 further comprising the step of:

implementing said modulator to reduce signal delay between a sum path for the combined signals and individual channels receiving said plurality of input signals.

9. The method of claim 8 wherein a polyphase filter is used in said modulator to generate 90° quadrature signals.

10. The method of claim 1 wherein said weights used in said weighting step are adjusted by the step of:

adding an error signal into said weights to cancel said out-of-band components.

11. The method of claim 10 wherein said error signal is 180° out of phase with a sum channel combining said plurality of input signals.

12. The method of claim 1 wherein said weights are determined by a combination of maximal ratio combining (MRC) to align phases of said input signals to the same phase and to scale said input signals in proportion to a square root of a received signal-to-noise ratio and an interference nulling algorithm (INA) for generating said weights using an error signal which is 180° out of phase with a sum channel combining said plurality of said input signals.

13. The method of claim 12 wherein said error signal is $(x - \frac{A}{\sqrt{P_x}} .x)$.

14. The method of claim 12 further comprising the steps of:

regulating a magnitude of said weights using a feature of $1 - \frac{A}{\sqrt{P_x}}$ wherein the magnitude of $\sqrt{P_x}$ is affected by the magnitude of said weights if each of said weights are smaller than their nominal value, $\sqrt{P_x} < \sqrt{P_{nom}}$ or $\sqrt{P_x} - A$ is larger than nominal value $\sqrt{P_x} - A$,

driving said weights larger until each of said weights reaches the value $\sqrt{P_x} - A$ or $\sqrt{P_x} > \sqrt{P_{nom}}$, $\sqrt{P_x} - A$ is smaller than the nominal value $\sqrt{P_x} - A$ is smaller driving said weights until each of said weights reaches the nominal value $\sqrt{P_x} - A$.

15. The method of claim 12 further comprising the steps of regulating a magnitude of said weights using a feature of $\sqrt{P_x} - A$ wherein the magnitude of $\sqrt{P_x}$ is affected by the magnitude of said weights if each of said weights are smaller than their nominal value, $\sqrt{P_x} < \sqrt{P_{nom}}$ or $1 - \frac{A}{\sqrt{P_x}}$ is larger than nominal value $1 - \frac{A}{\sqrt{P_{nom}}}$, driving

said weights larger until each of said weights reaches the value $1-\frac{A}{\sqrt{P_{nom}}}$ or $\sqrt{P_x} > \sqrt{P_{nom}}$, $1-\frac{A}{\sqrt{P_x}}$ is smaller than the nominal value $1-\frac{A}{\sqrt{P_{nom}}}$ is smaller driving said weights until each of said weights reaches the nominal value $1-\frac{A}{\sqrt{P_{nom}}}$.

16. The method of claim 1 wherein after said combining step further comprising the step of:

applying a conjugate of one of said weights to said output signal.

17. The method of claim 16 wherein said conjugate of one of said weights is determined from said one of said weight having a largest magnitude.

18. The method of claim 12 further comprising the step of:

combining said weights determined from said MRC with weights determined from one or more second MRC; and

combining weights determined from said INA with weights determined from one or more second INA.

19. A method for operating a transmit and receive beam forming system comprising the steps of:

a. receiving a plurality of input signals;

b. weighting said plurality of input signals with weights, weights are adjusted to increase power in said output signal of in-band components and decrease power in said output signal of out-of-band components; and

c. combining said weighted plurality of signals to form an output signal;

d. transmitting a beam towards a desired signal detecting wherein a complex conjugate said weights are used for transmitting said beam.

20. The method of claim 19 wherein after said step b. said weights are frozen and said weights are applied for transmitting in step d.

21. The method of claim 20 wherein said weights are determined by the steps of:

determining a complex error signal by a complex conjugate multiplication of each of said individual signals and a reference complex signal; and

low pass filtering said error signal to determine said weights.

22. The method of claim 20 wherein said input signal is a time division duplex signal and a control signal is used to freeze said weights at an end of a packet and use said weights for transmitting a signal in step d.

23. The method of claim 22 wherein said control signal occurs at an end of a preamble of said packet and when said control signal occurs said weights are frozen and are used in transmitting step d.

24. The method of claim 20 wherein steps a-d are repeated for a plurality of devices.

25. The method of claim 24 wherein after steps a-c further comprising the steps of:

identifying said weights for one of said devices; and

storing said identified weights; and

during said transmitting step d. retrieving said stored identified weight for said device.

26. A system for operating a wireless communication system receiver comprising:

means for receiving a plurality of input signals;

means for weighting said plurality of input signals; and

means for combining said weighted plurality of signals to form an output signal,

wherein weights used in said weighting step are adjusted to increase power in said output signal of in-band components and decrease power in said output signal of out-of-band components.

27. The system of claim 26 wherein said weights are determined by maximal ratio combining (MRC) to align phases of said input signals to the same phase and to scale said input signals in proportion to a square root of a received signal-to-noise ratio.

28. The system of claim 27 further comprising means for normalizing the signal level before weighting said plurality of input signals.

29. The system of claim 27 further comprising:

means for adjusting a signal level of the received input signals if said signal level is greater than a predetermined value.

30. The system of claim 26 wherein said weights are determined by:

means for determining a complex error signal by a complex conjugate multiplication of each of said input signals and a reference complex signal; and

means for low pass filtering said error signal to determine said antenna weights.

31. The system of claim 27 further comprising:

means for maintaining a magnitude of said weights.

32. The system of claim 26 wherein said weights are applied to a respective one at said input signals using a modulator.

33. The system of claim 32 wherein:

said modulator reduces signal delay between a sum path for the combined signals and individual channels receiving said plurality of input signals.

34. The system of claim 33 wherein a polyphase filter is used in said modulator to generate 90° quadrature signals.

35. The system of claim 26 wherein said weights are adjusted by adding an error signal into said weights to cancel said out-of-band components.

36. The system of claim 35 wherein said error signal is 180° out of phase with a sum channel combining said plurality of input signals.

37. The system of claim 26 wherein said weights are determined by a combination of maximal ratio combining (MRC) to align phases of said input signals to the same phase and to scale said input signals in proportion to a square root of a received signal-to-noise ratio and an interference nulling algorithm (INA) for generating said weights using an error signal which is 180° out of phase with a sum channel combining said plurality of said input signals.

38. The system of claim 37 wherein said error signal is $(x - \frac{A}{\sqrt{p_x}}.x)$.

39. The system of claim 38 wherein a magnitude of said weights is regulated using a feature of $1 - \frac{A}{\sqrt{P_x}}$ wherein the magnitude of $\sqrt{P_x}$ is affected by the magnitude of said weights if each of said weights are smaller than their nominal value, $\sqrt{P_x} < \sqrt{P_{nom}}$ or $\sqrt{P_x} - A$ is larger than nominal value $\sqrt{P_x} - A$,

driving said weights larger until each of said weights reaches the value $\sqrt{P_x} - A$ or $\sqrt{P_x} > \sqrt{P_{nom}}$, $\sqrt{P_x} - A$ is smaller than the nominal value $\sqrt{P_x} - A$ is smaller driving said weights until each of said weights reaches the nominal value $\sqrt{P_x} - A$.

40. The system of claim 37 wherein a magnitude of said weights is regulated using a feature of $\sqrt{P_x} - A$ wherein the magnitude of $\sqrt{P_x}$ is affected by the magnitude of said weights if each of said weights are smaller than their nominal value, $\sqrt{P_x} < \sqrt{P_{nom}}$ or $1-\frac{A}{\sqrt{P_x}}$ is larger than nominal value $1-\frac{A}{\sqrt{P_{nom}}}$, driving said weights larger until each of said weights reaches the value $1-\frac{A}{\sqrt{P_{nom}}}$ or $\sqrt{P_x} > \sqrt{P_{nom}}$, $1-\frac{A}{\sqrt{P_x}}$ is smaller than the nominal value $1-\frac{A}{\sqrt{P_{nom}}}$ is smaller driving said weights until each of said weights reaches the nominal value $1-\frac{A}{\sqrt{P_{nom}}}$.

41. The system of claim 26 wherein a conjugate of one of said weights is applied to said output signal.

42. The system of claim 37 wherein said conjugate of one of said weights is determined from said one of said weight having a largest magnitude.

43. The system of claim 37 wherein:

combining said weights determined from said MRC with weights determined from one or more second MRC; and

combining weights determined from said INA with weights determined from one or more second INA.

44. A system for operating a transmit and receive beam forming system comprising:

means for receiving a plurality of input signals;

means for weighting said plurality of input signals with weights, weights are adjusted to increase power in said output signal of in-band components and decrease power in said output signal of out-of-band components; and

means for combining said weighted plurality of signals to form an output signal;

means for transmitting a beam towards a desired signal detecting wherein a complex conjugate said weights are used for transmitting said beam.

45. The system of claim 44 wherein said weights are determined by means for determining a complex error signal determined by a complex conjugate multiplication of each of said individual signals and a reference complex signal; and

means for low pass filtering said error signal to determine said weights.

46. The system of claim 44 wherein said input signal is a time division duplex signal and a control signal is used to freeze said weights at an end of a packet and use said weights is said means for transmitting a beam.

47. The system of claim 46 wherein said control signal occurs at an end of a preamble of said packet and when said control signal occurs said weights are frozen and are used in said means for transmitting.

49. The system of claim 44 wherein said system is used for a plurality of devices and further comprising:

means for identifying said weights for one of said devices; and

means for storing said identified weights; and

said means for transmitting retrieving said stored identified weight for said device for use in transmitting.

50. The method of claim 1 wherein said weights are determined by a constant modulus algorithm.

51. The system of claim 26 wherein said weights are determined by a constant modulus algorithm.